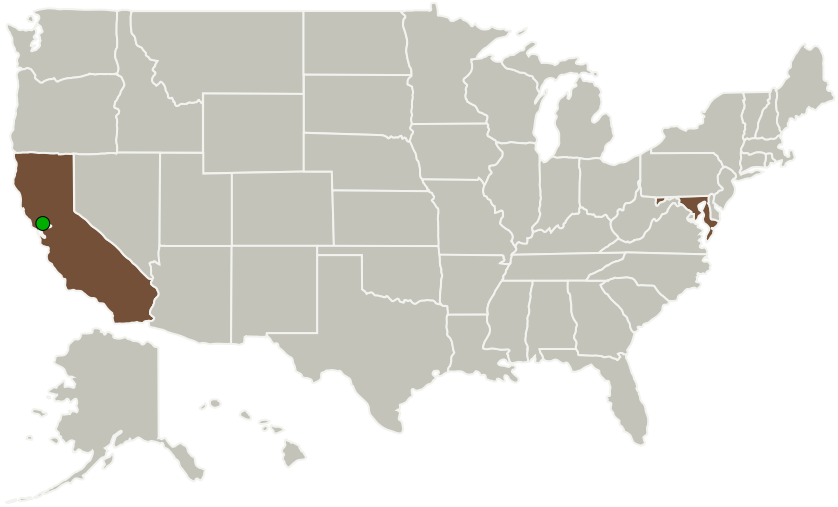
Verification and Validation of Flight Critical Systems, Phase I

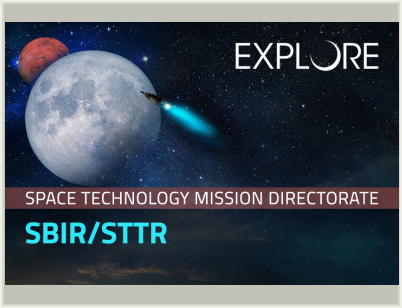
Completed Technology Project (2010 - 2010)

Project Introduction

Verification and Validation is a multi-disciplinary activity that encompasses elements of systems engineering, safety, software engineering and test. The elements that go into the V&V of a complex, software intensive product come out of activities that are performed by all of these disciplines while also spanning the complete system development cycle. As modern systems become more reliant on software intensive solutions to perform mission and safety critical functions, the effort that is required for system certification experiences a corresponding increase. These systems are expected to perform correctly and safely while being flexible and portable enough to go though system refresh cycles and evolvable enough to take on new system functionality throughout the system lifecycle. . We propose a method of addressing this challenge with advanced modular safety cases to specify system safety properties and support the V&V of those properties with argument and evidence chains. The modular safety cases make use of formal specification of safety claims and use contracts to formalize the dependencies between the case modules. These cases can be used to form powerful verification and validation arguments for a system that are maintainable and can be used to support incremental V&V techniques.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
WW Technology Group	Lead Organization	Industry	Ellicott City, Maryland
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Maryland

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139542)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

WW Technology Group

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

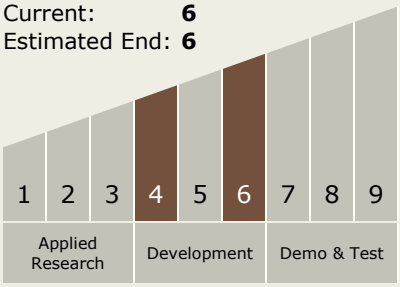
Carlos Torrez

Principal Investigator:

Chris Walter

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.4 Engineering and Integrity
    - TX10.4.1 Verification and Validation of Autonomous Systems

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System